



**SUBJECT:** A farmer was killed while bypass-starting his tractor.

## SUMMARY

An 84-year-old farmer died on May 21, 2005 from injuries received after he was run over by the rear tire of a farm tractor he was attempting to bypass-start. The decedent was using one tractor to start a second tractor that was malfunctioning. The victim positioned himself between the two tractors and attached a set of jumper cables to the batteries. He then used a pair of metal pliers to create a short circuit at the starter of the tractor. When the tractor started, it struck him and caused him to fall. The farmer was then run over, pulled under the tire, and ejected behind the tractor. The victim was pronounced dead at the scene.

**Agriculture requires a lot of work, and shortcuts may be tempting, but they are often dangerous. Bypass-starting is one of the more hazardous shortcuts.**

Oklahoma Fatality Assessment and Control Evaluation (OKFACE) investigators concluded that to help prevent similar occurrences, farmers should:

- Ensure that tractor engines are started from the operator's seat with the transmission and power take-off in neutral and the parking brake engaged.
- Follow safe start-up procedures included in the operator's manual and designated by decals on the tractor.
- Ensure that tractors are properly shut down after each use.
- Periodically check the working condition of safety start switches and arrange to have any malfunctions repaired promptly.

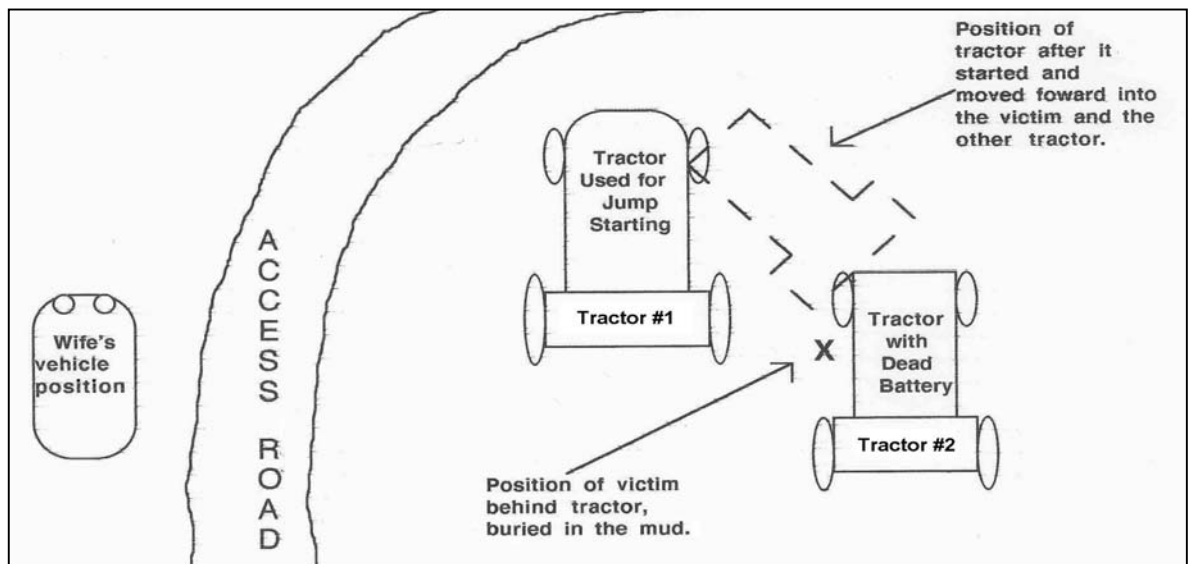


Figure 1. Diagram of the scene (not to scale)

## INTRODUCTION

On May 21, 2005, an 84-year-old farmer was killed when he was struck and run over by a tractor he was attempting to bypass-start. OKFACE investigators were notified of the incident and conducted an interview with the investigating officer on July 8, 2005. OKFACE investigators reviewed the death certificate, photos of the incident, and reports from the Medical Examiner, sheriff, and highway patrol.

**Victim:** The victim was a self-employed owner/operator of a farm. He had been involved in farming for over 60 years. The victim owned the field where the incident occurred and had worked at that site for many years. He was working with two tractors at the time of the incident that were each about 30 years old.

**Training:** At this privately owned, sole proprietor operation, there were no written safety procedures in use. It is unknown if the decedent received any formal safety training on the use of the machinery he operated.

**Incident Scene:** The scene of the incident was a large, very wet and muddy, freshly plowed agricultural field. The approximate time of day was 7:00-7:30 p.m.

**Weather:** The weather clear and dry. However, the ground conditions were wet and muddy due to rain from previous days. The ground was also very rutted from plowing, which had occurred prior to the rainstorms.

## INVESTIGATION

On the day of the incident, the victim needed to use a tractor that had a dead battery (tractor #2). Wanting to bypass-start it, the victim drove another tractor (tractor #1) to the field where it was located, while his wife followed him in a vehicle with emergency flashers. The decedent parked tractor #1 near tractor #2, each facing the same direction, and his wife parked on the other side of the access road (Figure 1). Tractor #2 had been left in gear when the battery died and the front axle was turned toward the left. The victim parked tractor #1 on the left side of tractor #2.



Figure 2. Front view of the tractors after the collision occurred

The victim positioned himself between the two tractors and attached a set of jumper cables to both tractors' batteries. Instead of sitting in the operator's seat and using the ignition to start the tractor, he remained on the ground between the two tractors and used a pair of pliers to

bypass the ignition switch and create a short circuit to the starter of tractor #2. When tractor #2 started, it moved forward at an angle and struck the victim, causing him to fall to the muddy ground. Tractor #2 continued moving forward until it struck tractor #1 and pushed it west approximately 10 feet, with the front axle of tractor #2 under the front axle of tractor #1 (Figure 2). The left rear tire of tractor #2 was spinning in the mud and dug into the ground about five feet. The victim was run over, pulled under the tire, and ejected behind the tractor. The rear wheel of the tractor continued to spin, throwing mud onto the decedent (Figure 3).

During the incident, the victim's wife remained in the parked vehicle until she noticed that her husband had a problem and may have been injured. Unable to walk across the muddy and rutted terrain of the field, she drove to a neighbor's house to ask for help. The neighbor called for emergency response and returned to the incident site with her. By that time, the victim was completely buried under the mud except for one foot. The victim was pronounced dead at the scene by emergency responders.



Figure 3. Rear view of the tractors after the collision occurred

## CAUSE OF DEATH

The Medical Examiner listed the cause of death as multiple injuries (full body).

## RECOMMENDATIONS

**Recommendation #1:** Farmers should ensure that tractor engines are started from the operator's seat with the transmission and power take-off in neutral and the parking brake engaged.

**Discussion:** Farmers should start the engine of a tractor with a key from the operator's seat, which is the safest place to be during machine operation. Bypass-starting is often viewed as a timesaving shortcut to addressing a malfunction. The term "bypass-starting" points to its danger. It bypasses all the safety start and neutral start switches engineered in the tractor's electrical and hydraulic systems. If the tractor is left in gear and a bypass-start is performed, the starter will engage and the engine will start as soon as the circuit is complete. The operator does not have enough time to jump away and may be pulled down by the drive wheel, run over, crushed, or otherwise injured. The running tractor also has the potential to injure others and destroy property. Tractors should be started with the transmission and power take-off (PTO) in neutral and the parking brake set. Operators should be seated with the seat belt securely fastened. If the tractor is not equipped with a rollover protective structure (ROPS), then a seat belt should not be worn. Operators should be careful not to position themselves or others in or near a tractor's point of operation. Agriculture requires a



lot of work, and shortcuts may be tempting, but they are often dangerous. Bypass-starting is one of the more hazardous shortcuts.

**Recommendation #2: Farmers should follow safe start-up procedures included in the operator's manual and designated by decals on the tractor.**

Discussion: The operator's manual should be used for guidance on safe start-up procedures and operators should pay attention to all decals and safety labels placed on their equipment. Labels with the words DANGER, WARNING, and CAUTION and safety alert symbols contain important information on serious safety hazards; additional details can be found in the operator's manual. Equipment dealers and manufacturers can provide new or additional safety decals for farm machinery. Decals should be kept clean and readily visible, acting as a frequent reminder to operators. Furthermore, the operator's manual should be consulted when the tractor's battery is dead so that safe procedures for recharging or using jumper cables are followed. Shorting across starter terminals and bypassing the safety start switches should not be considered safe start-up procedures. Bypass starter covers installed by the manufacturer should not be removed and other safety devices should not be circumvented. By following the manufacturer's recommendations when using jumper cables, the operator reduces the chances of injury from explosions, acid burns, or other causes.

**Recommendation #3: Farmers should ensure that tractors are properly shut down after each use.**

Discussion: Farmers should ensure that their tractors are properly shut down after each use by placing PTO and drive levers in neutral, lowering attachments to the ground, shutting off the engine, setting the parking brake, and removing the key. Whenever possible, tractors should be parked on level ground. If that is not feasible, then the tractor should be parked at a right angle to the slope and the wheels should be chocked. Safe shut down procedures should be used each time the tractor is no longer needed, in order to reduce the chances that it is started while unintentionally left in gear. Prior to performing any maintenance, farmers should ensure that the parking brake is engaged and the wheels are chocked to reduce the chances of any unintentional movement of the tractor. Operators should not dismount a tractor with the engine running unless they are following a manufacturer recommended operating procedure.

**Recommendation #4: Farmers should periodically check the working condition of safety start switches and arrange to have any malfunctions repaired promptly.**

Discussion: Tractor operators should periodically take a few seconds and ensure that all safety start switches are in proper working order. If malfunctions are identified, the farmer should arrange to have the problem repaired as soon as possible. This check should only be done when there are no people, animals, or other obstructions around the tractor. Operators should follow these steps when performing this quick safety check:

- ✓ Depress the clutch and brake pedals and attempt to start the engine with the gears disengaged and the PTO in neutral. The starter should engage.
- ✓ Depress the clutch and brake pedals and attempt to start the engine with the gears engaged and the PTO in neutral. The starter should not engage.





- ✓ Depress the clutch and brake pedals and attempt to start the engine with the gears in neutral and the PTO engaged. The starter should not engage.
- ✓ For tractors with clutch-mounted start switches, depress only the brake pedal and attempt to start the engine with the transmission and PTO in neutral. The starter should not engage.

## REFERENCES

- Occupational Safety and Health Administration, 29 CFR 1928.57 *Guarding of Farm Field Equipment, Farmstead Equipment, and Cotton Gins*.
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- Kubota Tractor Corporation, *The Ten Commandments of Tractor Safety*, 2005.
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- Injury Prevention Service, Oklahoma State Department of Health, *Jump-Start/Bypass-Start-Related Fatalities in Oklahoma, July 1997-February 2005*, August, 5, 2005.

The Oklahoma Fatality Assessment and Control Evaluation (OKFACE) is an occupational fatality surveillance project to determine the epidemiology of all fatal work-related injuries and identify and recommend prevention strategies. FACE is a research program of the National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research.

These fatality investigations serve to prevent fatal work-related injuries in the future by studying the work environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in injury, and the role of management in controlling how these factors interact.

For more information on fatal work-related injuries, please contact:

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[www.health.ok.gov/program/injury](http://www.health.ok.gov/program/injury)